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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09 943,085	08 31 2001	Masayuki Hirano	046124-5092	7669

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EXAMINER

WANG, GEORGE Y

ART UNIT PAPER NUMBER

2882

DATE MAILED: 12/16/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/943,085

Applicant(s)

HIRANO ET AL.

Examiner

George Y. Wang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☐ Claim(s) 1 and 3-5 is/are pending in the application.
- 4a) Of the above claim(s) 2 and 6 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1 and 3-5 is/are rejected.
- 7) ☐ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 31 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Objections*

1. Claim 3 is objected to because as being improper since the claim is dependent upon a claim 2, which has been canceled without prejudice or disclaimer in the communication received 27 November 2002. However, for examination purposes, it was considered as through it was dependent from claim 1. Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1 and 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skillicorn et al. (U.S. Patent No. 5,077,771, from hereinafter "Skillicorn") in view of Yahata et al. (U.S. Patent No. 4,734,924, from hereinafter "Yahata").

4. Regarding claim 1, Skillicorn discloses an X-ray generating apparatus having an X-ray tube (fig. 2, ref. 44) within a housing sealed into vacuum for generating an X-ray by focusing an electron emitted from a cathode (fig. 5, ref. 68) into an anode target (fig. 2, ref. 58) by way of a grid electrode (fig. 2 ref. 70) and a focusing electrode (fig. 2, ref. 72). The apparatus also includes a grid voltage control for controlling a grid voltage applied to grid electrode (col. 4, lines 60-66), and pulse generator (fig. 2, ref. 10) which changes from an OFF state to an ON state and keeps the ON state for a predetermined period of time (col. 4, lines 60-66).

Although Skillicorn teaches a cathode detection resistor (fig. 5, ref. 188), Skillicorn, however, fails to specifically disclose that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state.

Yahata discloses an x-ray generator with a cathode current detection means (fig. 1, ref. 21; fig. 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a cathode current detection means so that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state (col. 2, line 58 – col. 3, line 29). One would be further motivated to include a cathode current detection means because it produces a second switching means for short-circuit detection as a result of current. This detection of an abnormal current at the sides of the x-ray tube, when detected, results in a noncoincidence between voltages across resistors to immediately opens the power source switch and filament switch and prevents x-ray projection (col. 2, line 58 – col. 3, line 29). A cathode current detection means assists the system in reducing malfunction as well as increase productivity control in ON and OFF states (col. 3, lines 8-29).

5. As to claim 3, which is assumed by Examiner to be dependent on claim 1 (see above objection), Skillicorn discloses an X-ray generating apparatus as recited above with a cathode current detecting resistor (fig. 5, ref. 188). The grid voltage control

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possesses a negative voltage generating section for generating a predetermined negative voltage (col. 10, lines 30-32), a pulse inverter (fig. 6a, ref. 232) for inputting and generating an inverted pulse in which the ON and OFF states of the inputted pulse are inverted, a switch (fig. 6a, ref. 26) for inputting the inverted pulse generated by the pulse inverter and outputting, when the inverted pulse is in the ON state, the predetermined negative voltage generated by the negative voltage generating section, a reference voltage generating section for generating a reference positive voltage (fig. 5, ref. 55), a second switch (fig. 6a, ref. 36) for inputting the pulse generated by the pulse generating means and outputting, when the pulse is in the ON state, the reference positive voltage (col. 10, lines 30-32) generated by the reference voltage generating section, an operational amplifier (fig. 5, ref. 260) having one input terminal for inputting a voltage generated by the cathode current detecting resistor and the other input terminal for inputting the predetermined negative voltage outputted from the switch and the reference positive voltage outputted from the second switch, and a grid voltage control circuit (abstract) for controlling, in response to an output from the operational amplifier, the grid voltage applied to the grid electrode .

6. Regarding claim 4, Skillicorn discloses an X-ray generating apparatus having an X-ray tube (fig. 2, ref. 44) within a housing sealed into vacuum for generating an X-ray by focusing an electron emitted from a cathode (fig. 5, ref. 68) into an anode target (fig. 2, ref. 58) by way of a grid electrode (fig. 2 ref. 70) and a focusing electrode (fig. 2, ref. 72). The apparatus also includes a grid voltage control for controlling a grid voltage

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applied to grid electrode (col. 4, lines 60-66), and pulse generator (fig. 2, ref. 10) which changes from an OFF state to an ON state and keeps the ON state for a predetermined period of time (col. 4, lines 60-66). Skillicorn also teaches an X-ray imaging apparatus (col. 3, lines 11-13; col. 17, lines 36-40) that receives the pulse generated by the pulse generating means and captures the X-ray transmission image when the pulse is in the ON state. Furthermore, the Skillicorn reference teaches an X-ray inspection system (col. 17, lines 49-59) possessing the aforementioned x-ray generator, such that when the pulse generator has a trigger signal outputting means for outputting a trigger signal (col. 13, lines 42-47) according to the detection of the object and where the imaging means receives the pulse outputted from the pulse generator and captures the X-ray transmission image when the pulse is in the ON state.

Although Skillicorn teaches a cathode detection resistor (fig. 5, ref. 188), Skillicorn, however, fails to specifically disclose that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state.

Yahata discloses an x-ray generator with a cathode current detection means (fig. 1, ref. 21; fig. 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a cathode current detection means so that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state (col. 2, line 58 – col. 3, line 29). One would be further motivated to include a cathode current detection means because it produces a second switching means for short-circuit detection as a result of current. This detection of an abnormal current at the sides of the x-ray tube, when detected, results in a noncoincidence between voltages across resistors to immediately opens the power source switch and filament switch and prevents x-ray projection (col. 2, line 58 – col. 3, line 29). A cathode current detection means assists the system in reducing malfunction as well as increase productivity control in ON and OFF states (col. 3, lines 8-29).

7. Regarding claim 5, Skillicorn discloses an X-ray generating apparatus having an X-ray tube (fig. 2, ref. 44) within a housing sealed into vacuum for generating an X-ray by focusing an electron emitted from a cathode (fig. 5, ref. 68) into an anode target (fig. 2, ref. 58) by way of a grid electrode (fig. 2 ref. 70) and a focusing electrode (fig. 2, ref. 72). The apparatus also includes a grid voltage control for controlling a grid voltage



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applied to grid electrode (col. 4, lines 60-66), and pulse generator (fig. 2, ref. 10) which changes from an OFF state to an ON state and keeps the ON state for a predetermined period of time (col. 4, lines 60-66). Skillicorn also teaches an X-ray imaging apparatus (col. 3, lines 11-13; col. 17, lines 36-40) that receives the pulse generated by the pulse generating means and captures the X-ray transmission image when the pulse is in the ON state. Furthermore, the Skillicorn reference teaches an X-ray inspection system (col. 17, lines 49-59) possessing the aforementioned x-ray generator, such that when the pulse generator has a trigger signal outputting means for outputting a trigger signal (col. 13, lines 42-47) according to the detection of the object and where the imaging means receives the pulse outputted from the pulse generator and captures the X-ray transmission image when the pulse is in the ON state.

Although Skillicorn teaches a cathode detection resistor (fig. 5, ref. 188), Skillicorn, however, fails to specifically disclose that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state.

Yahata discloses an x-ray generator with a cathode current detection means (fig. 1, ref. 21; fig. 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated a cathode current detection means so that in response to a generated pulse, the grid voltage control applies a cutoff voltage to the grid electrode when pulse is in the OFF state so as to prevent electron emitted from the cathode from reaching the anode target and applies a grid operating voltage by a cathode current detecting means that detects a cathode current and is adjusted such that the electron emitted from the cathode so as to bombard the anode target attains a predetermined amount of quantity when the pulse is in the ON state (col. 2, line 58 – col. 3, line 29). One would be further motivated to include a cathode current detection means because it produces a second switching means for short-circuit detection as a result of current. This detection of an abnormal current at the sides of the x-ray tube, when detected, results in a noncoincidence between voltages across resistors to immediately opens the power source switch and filament switch and prevents x-ray projection (col. 2, line 58 – col. 3, line 29). A cathode current detection means assists the system in reducing malfunction as well as increase productivity control in ON and OFF states (col. 3, lines 8-29).

### ***Response to Arguments***

8. Applicant's arguments filed 27 November 2002 have been fully considered but they are not persuasive.

Applicant's amendment to include a cathode current detection means does not make the claims allowable over prior art since both Skillicorn and Yahata disclose a grid

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voltage control means having a cathode current detection means as recited above. In response to applicant's amendment, it is noted that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Therefore, Examiner asserts the validity of the prior art references and maintains rejection.

### ***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Y. Wang whose telephone number is 703-305-7242. The examiner can normally be reached on M-F, 8 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 703-305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

gw  
December 12, 2002

